Could rapid XRF analysis techniques provide a step change in our ability to map geochemical dispersion patterns through cover and deliver future mineral discoveries?

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Geological Survey of South Australia

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SOUTH AUSTRALIA

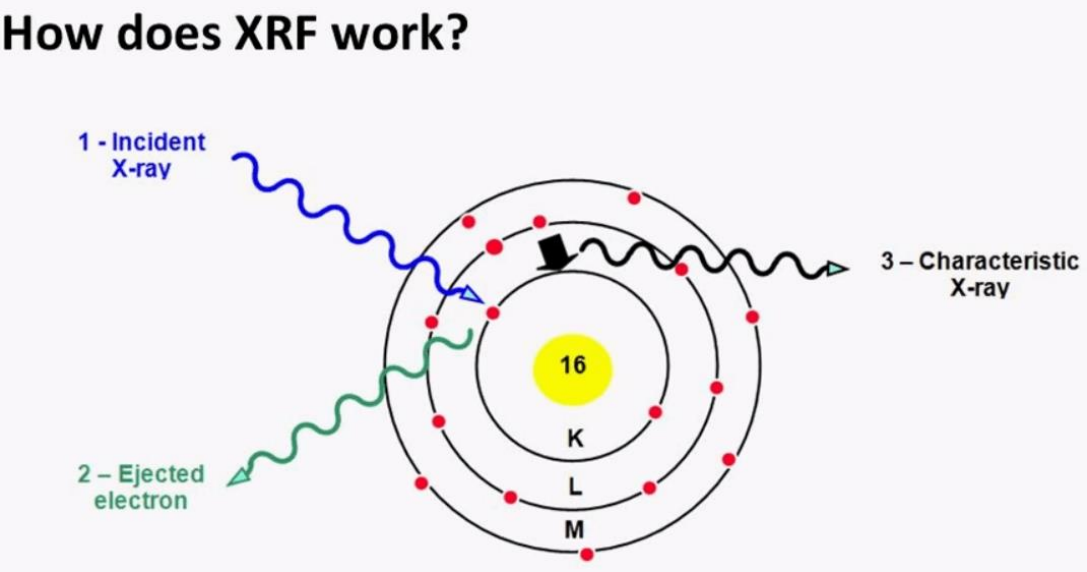
Government of South Australia

XRF (X-ray fluorescence)

Background

- Measure elemental abundances of a material
- Commonly used by exploration industry
- Key advantage = additional analyses only cost time
- Cover geochemistry rarely the focus of geochemical sampling

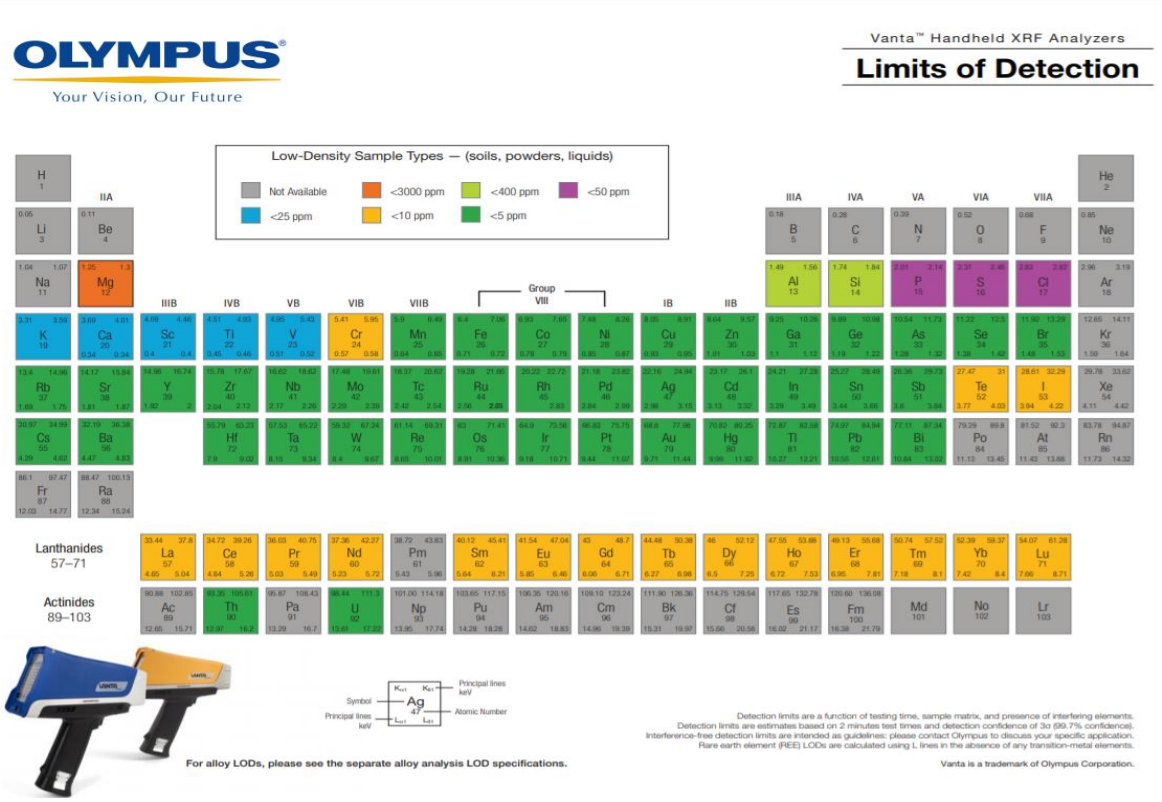
➢ What could it mean if geochemical data was routinely generated on all drill materials?



XRF (X-ray fluorescence)

Compromises of pXRF

- No Na, high DL's for Mg and many pathfinder elements. High sample resolution can make up for some shortcomings.



Recent developments in mineral exploration

Lab-at-Rig® and Minalyze

Lab-at-Rig ®

Minalyze.com

Lab-at-Rig® - utilising a waste stream

- Deep Exploration Technologies CRC – develop transformational technologies for the minerals industry
- LAR developed by CSIRO within DET CRC. Now commercialized by Imdex.
- Analysis of drill cuttings
- Utilises SRU, XRF, XRD

1 meter composite:
8.8kg powder + 9.8kg core

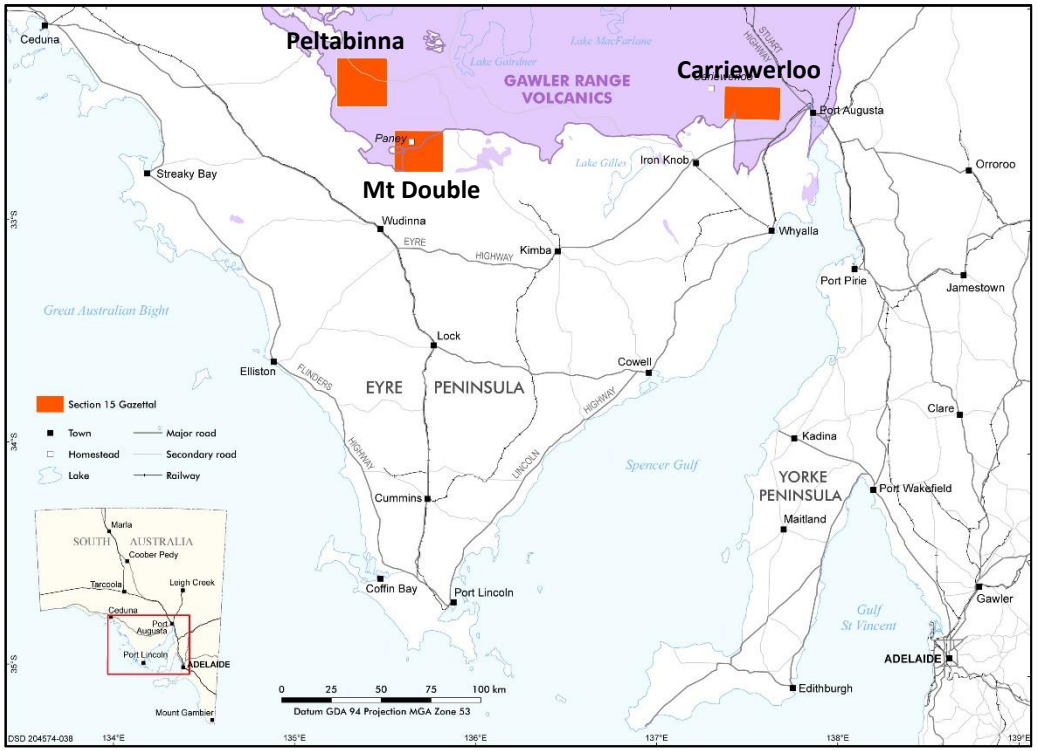
Mineral Systems Drilling Program

MSDP

- Collaborative drill program (GSSA + DET CRC + exploration industry)

LAR

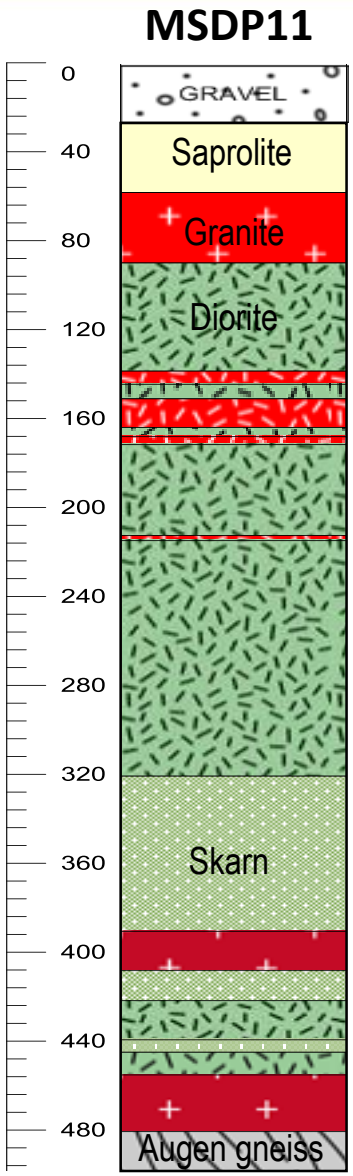
- Geochemical results within hours of drilling
- Analyses at 1-2 m intervals



Vision

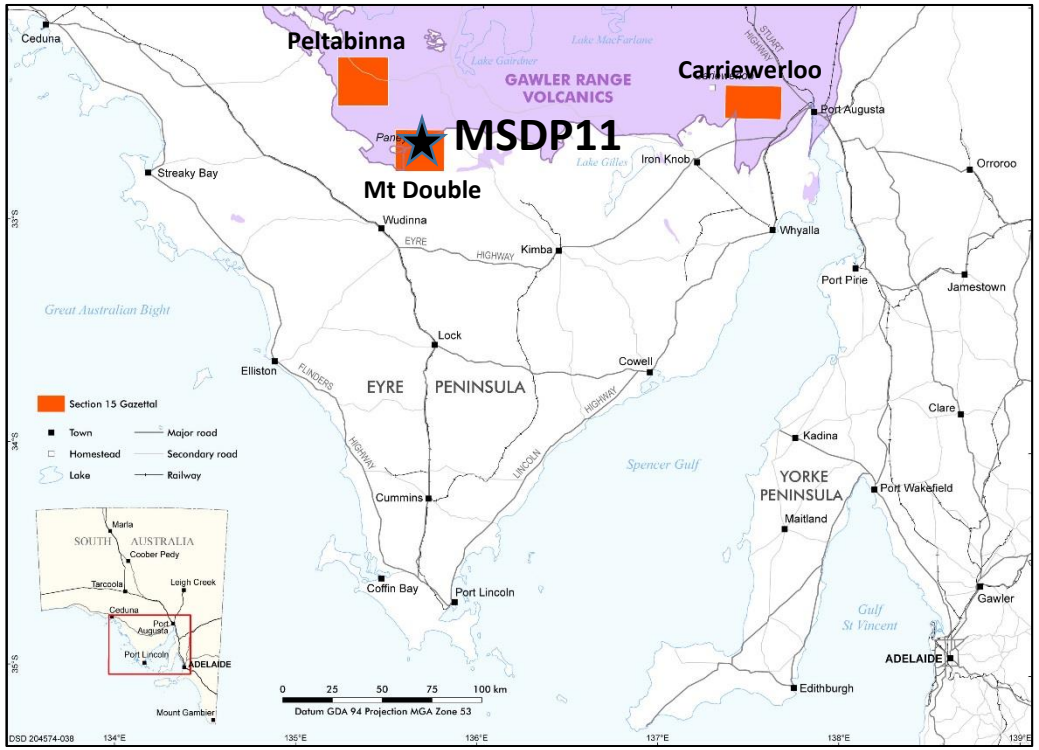
- Faster, cheaper drilling using CT-rig
- LAR an important part of DET CRC vision of ‘prospecting drilling’ and may feature in the National Drilling Initiative (MinEx CRC)
- ~1 m geochemical data from surface in holes across Australia

Mineral Systems Drilling Program

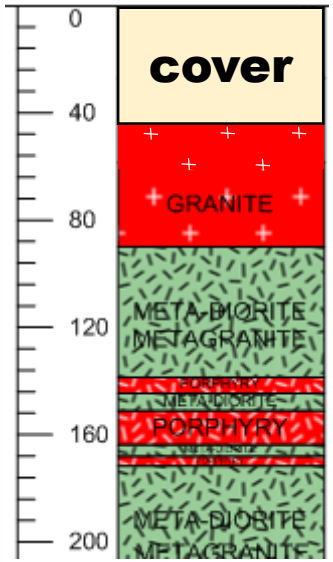


MSDP

- Diamond coring with LAR from surface
- MSDP11 – margin of Gawler Ranges

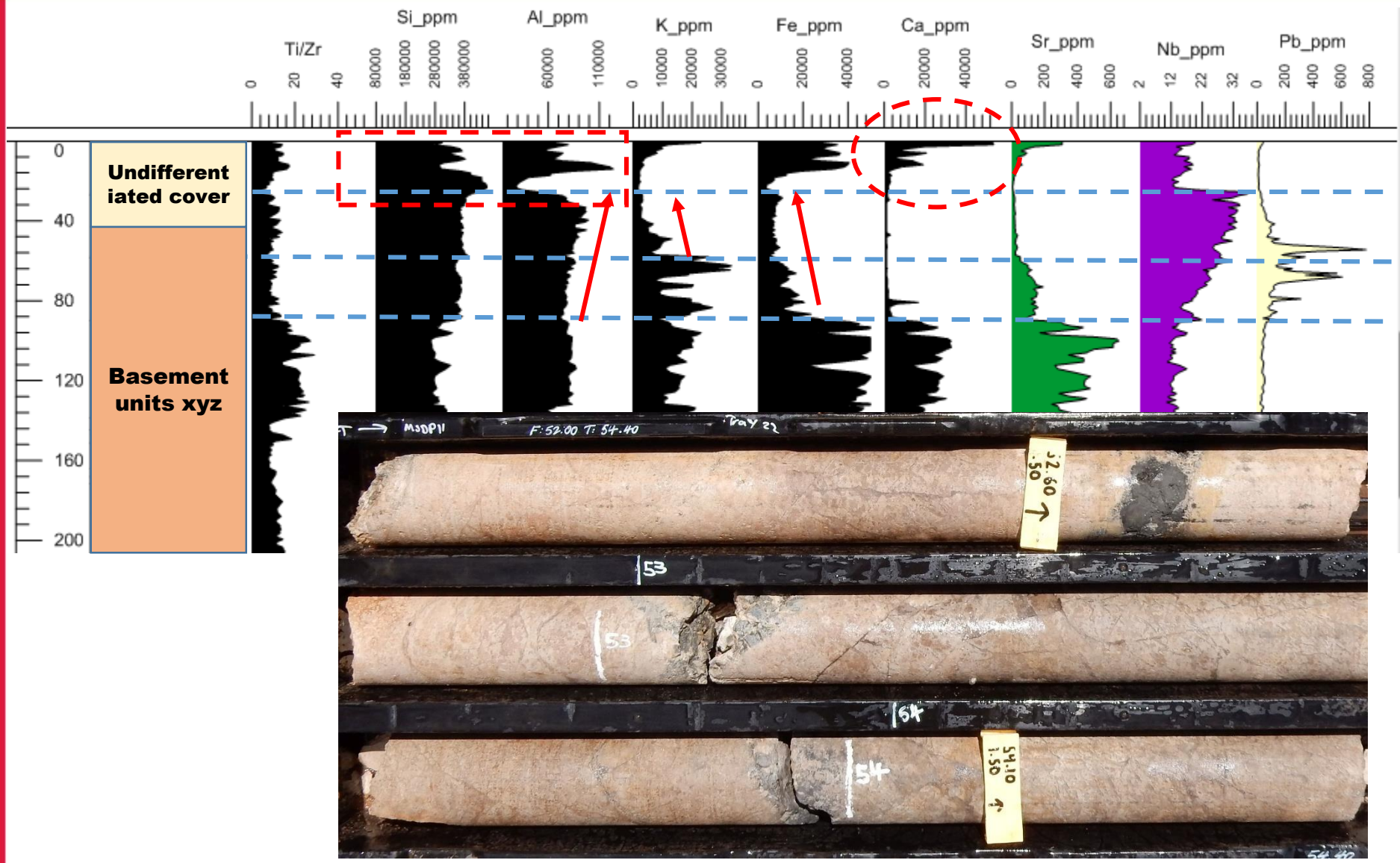


Mineral Systems Drilling Program



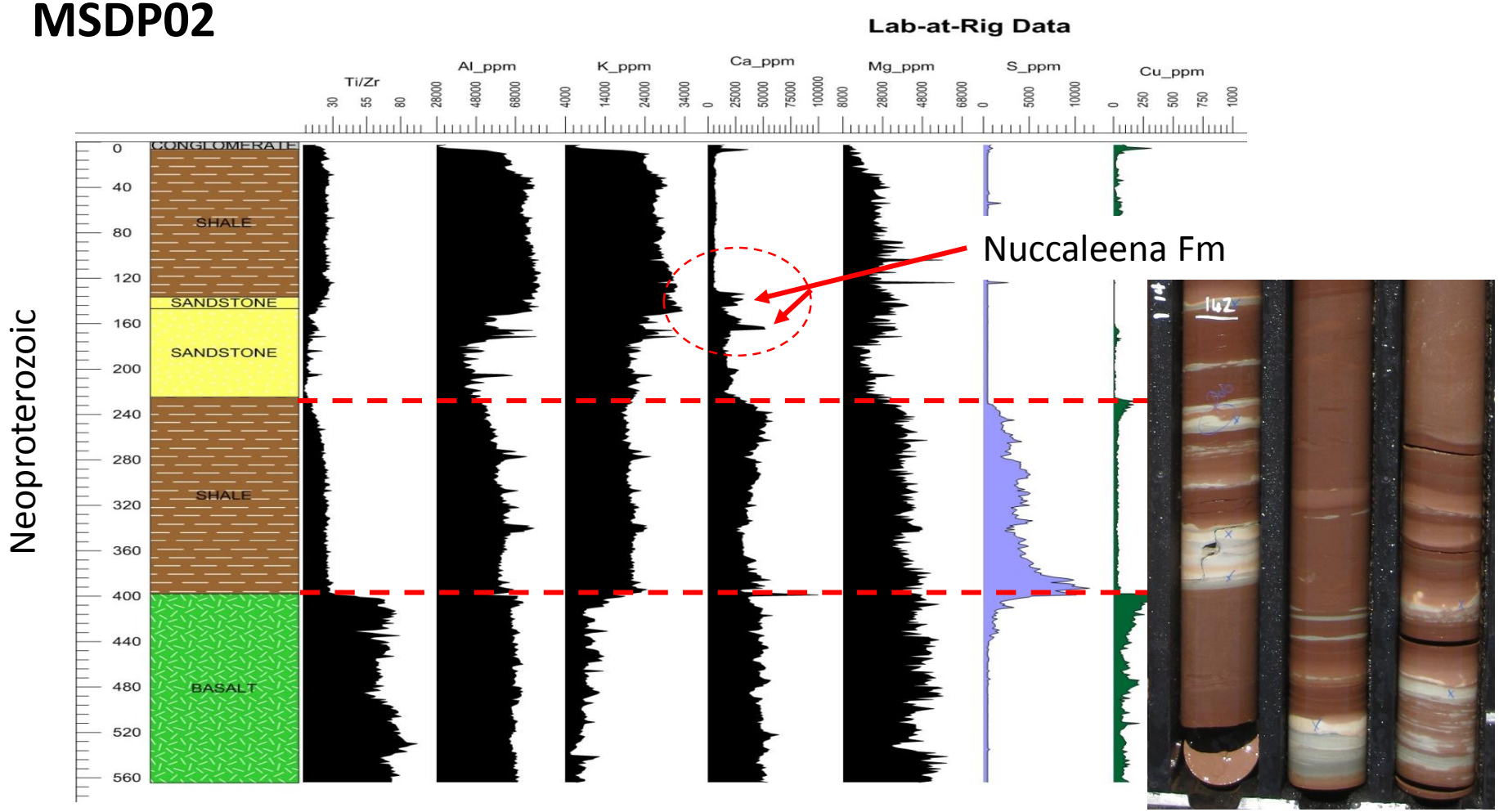
Igneous texture obvious in drill core from ~41 m

MSDP11 – LAR results



Mineral Systems Drilling Program

MSDP02

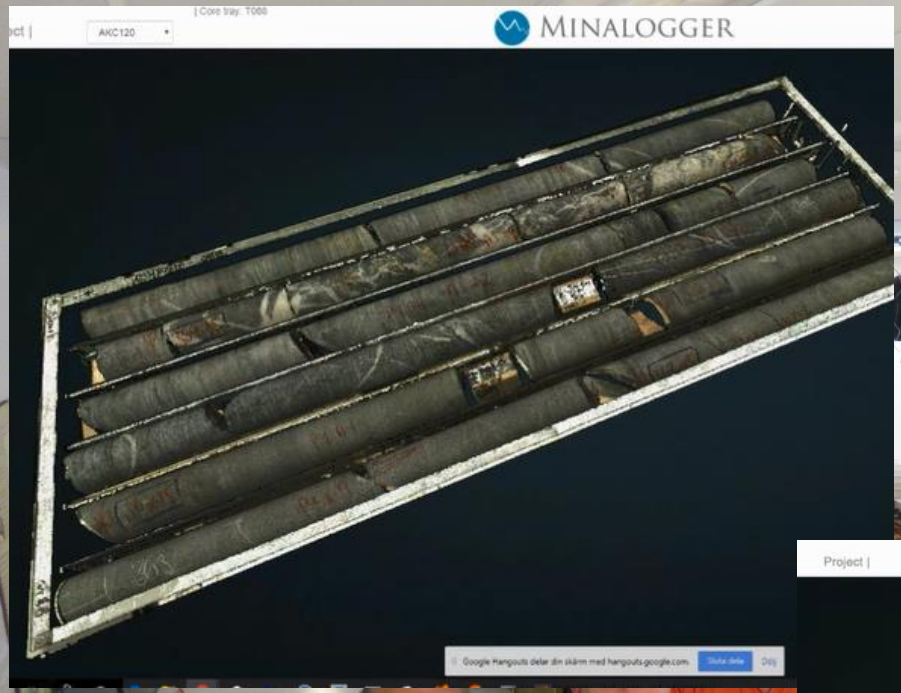


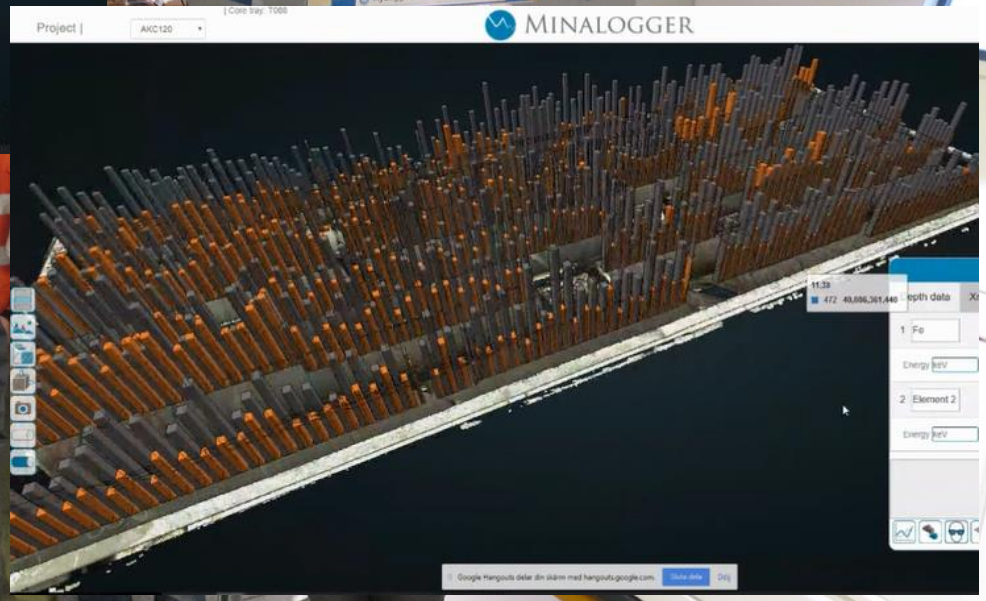
- Benefit of high resolution sampling – enables understanding that we would rarely get the opportunity to observe

SA Drill Core Reference Library - Minalyze

- Focus – reduce cost of gaining geochemical data
- Potential to analyse drill materials stored in Government repositories
- While basement core is the focus, cover materials can quite easily be analysed – <u>surface to EOH geochemistry</u>

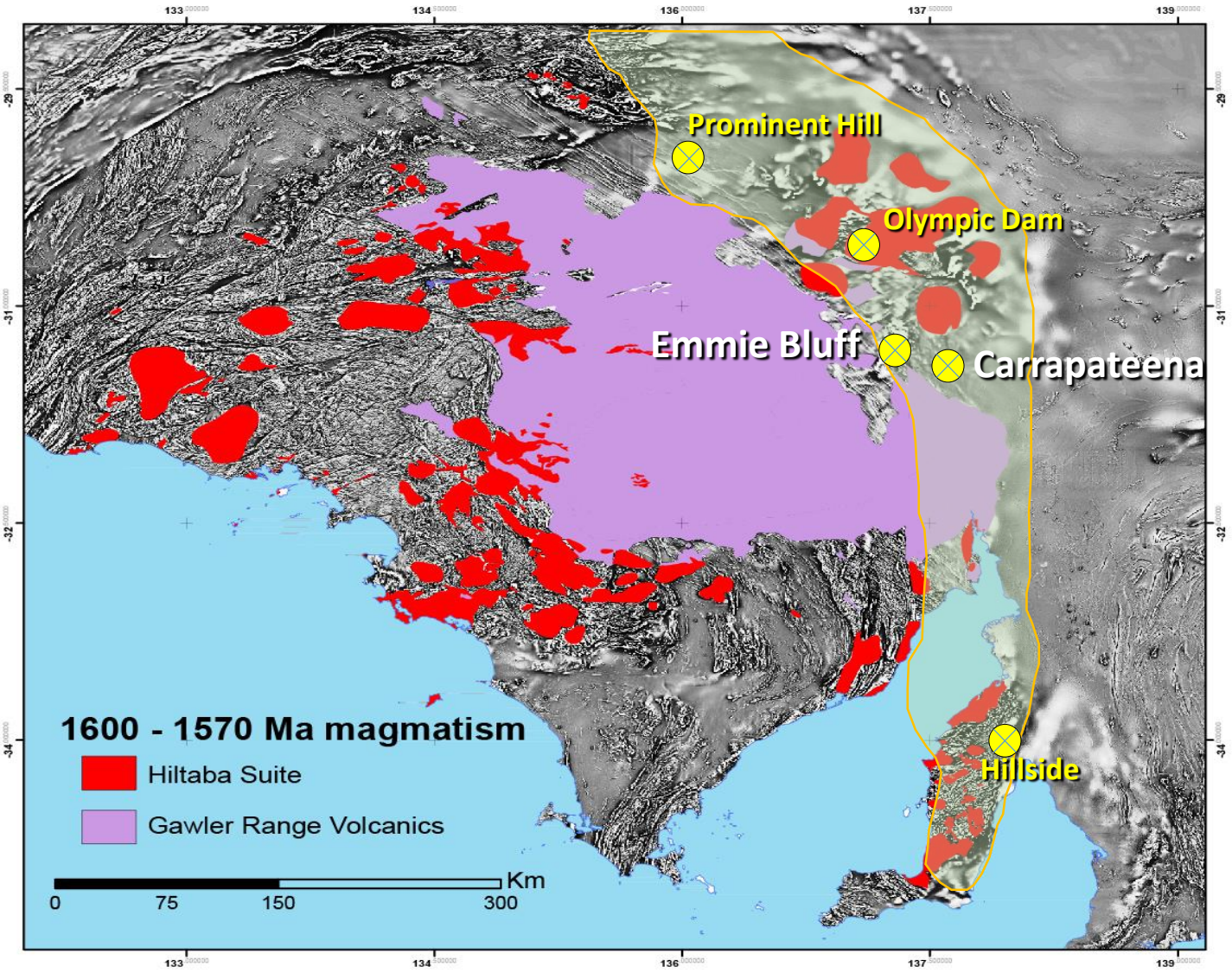
SA Drill Core Reference Library - Minalyze



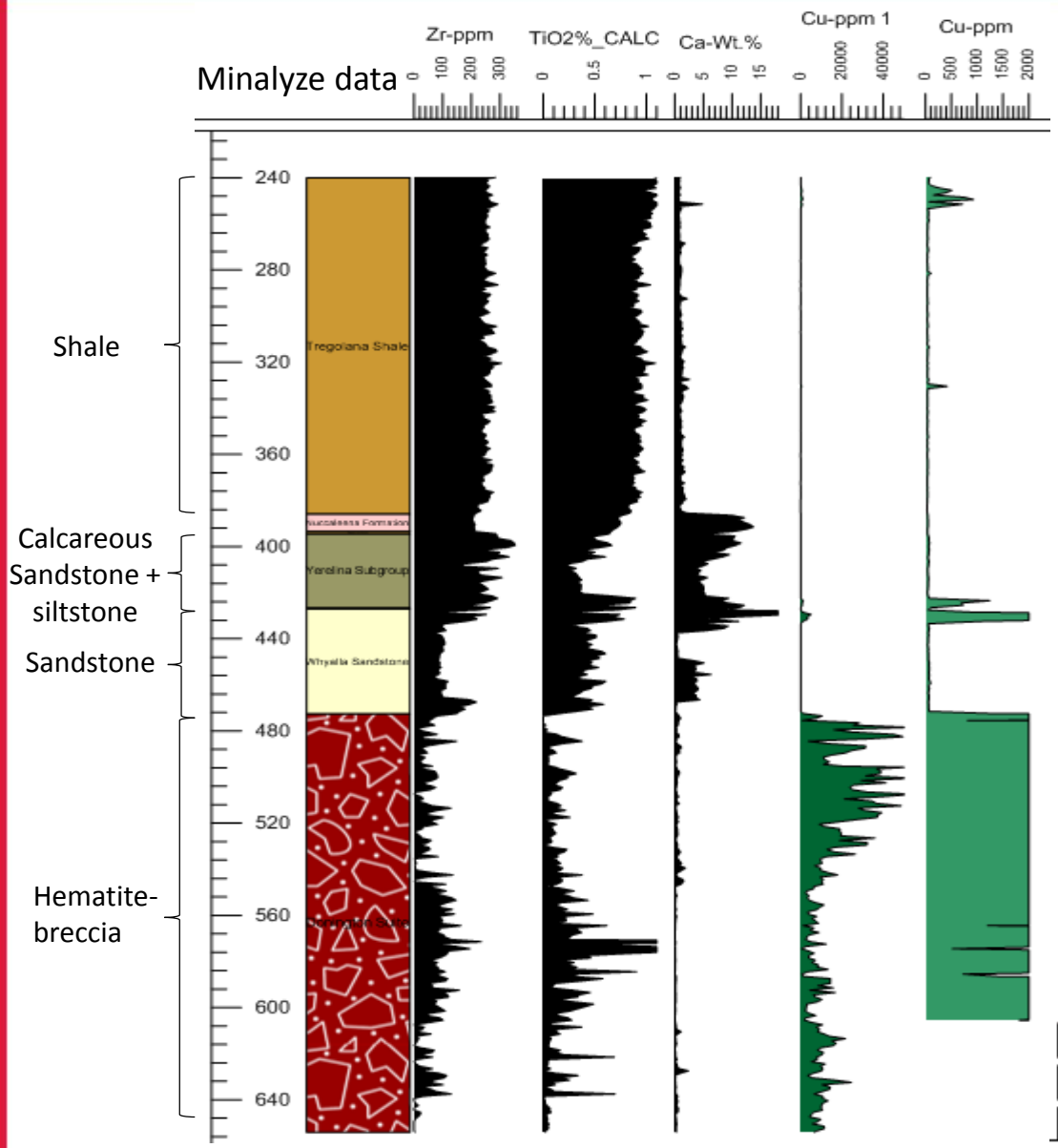


- Possibility of more dh's with surface to EOH geochemistry
- Current limitation – broken core difficult to analyse

Minalyze


Prominent Hill
Olympic Dam
Emmie Bluff
Carrapateena
Hillside
1600 - 1570 Ma magmatism
Hiltaba Suite
Gawler Range Volcanics
0
75
150
300
Km

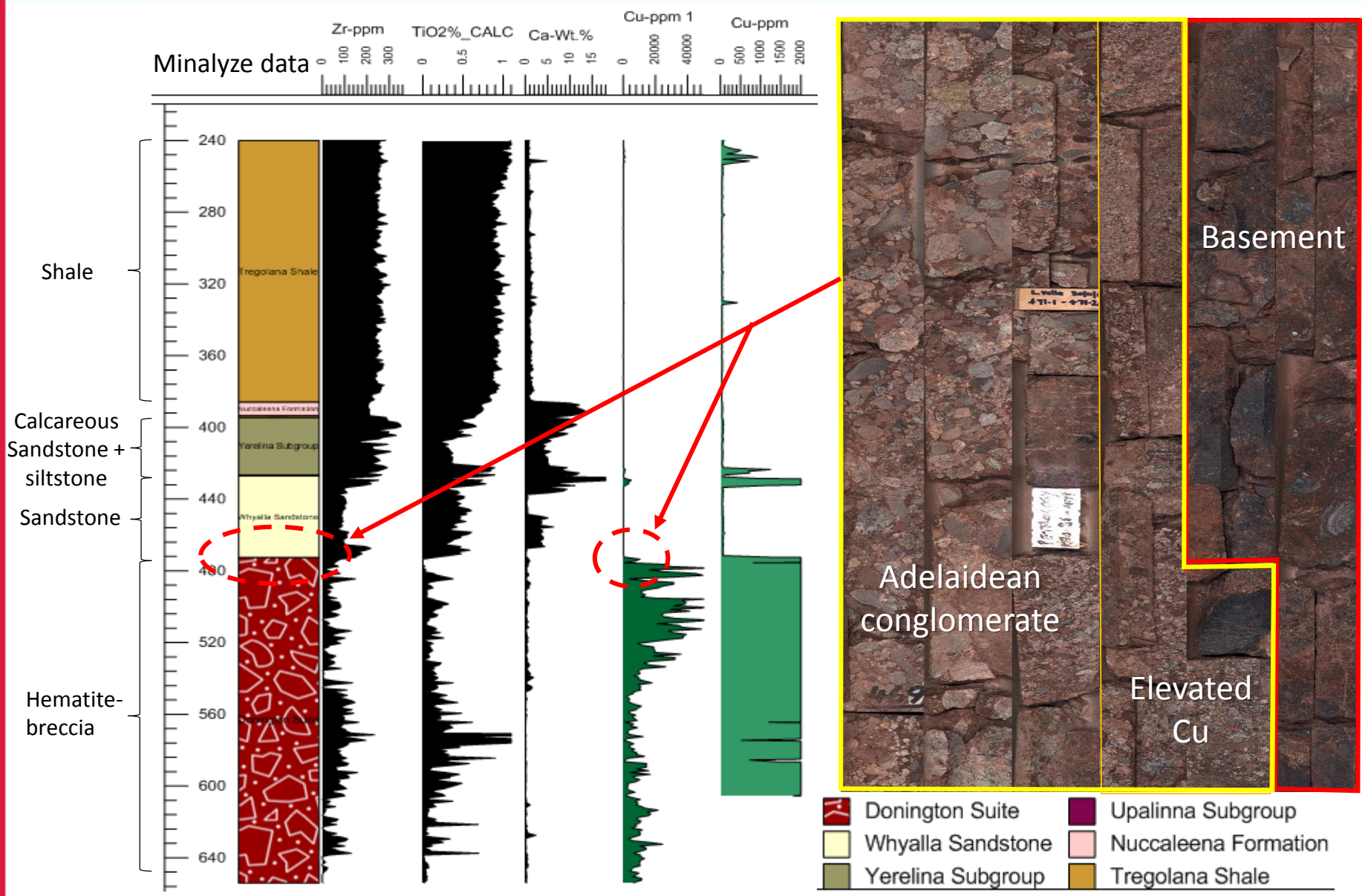
CAR02 – Carrapateena discovery hole



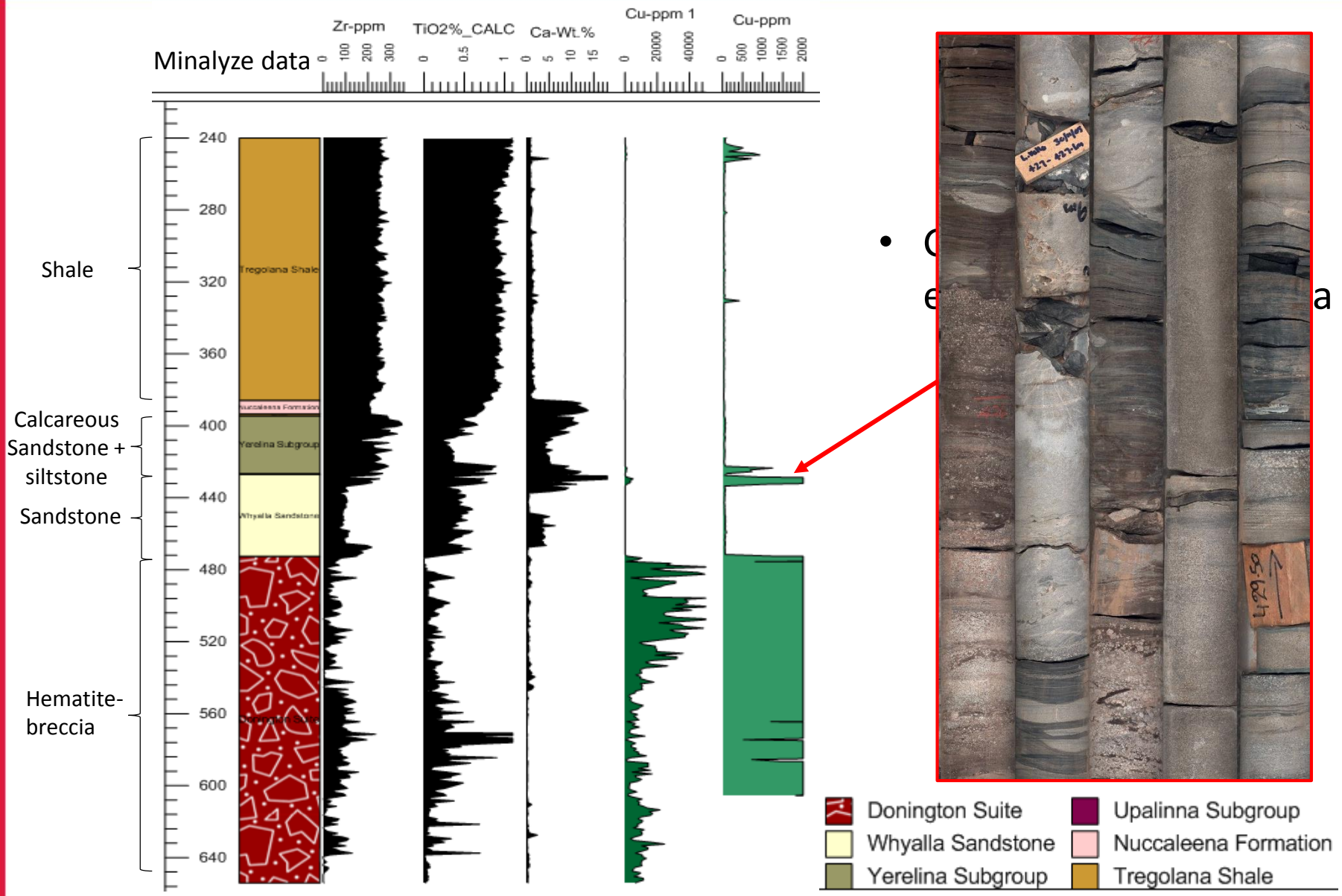
- Gravels at U/C are effective sample media

Donington Suite
Whyalla Sandstone
Yerelina Subgroup
Upalinna Subgroup
Nuccaleena Formation
Tregolana Shale

CAR02 – Carrapateena discovery hole



CAR02 – Carrapateena discovery hole



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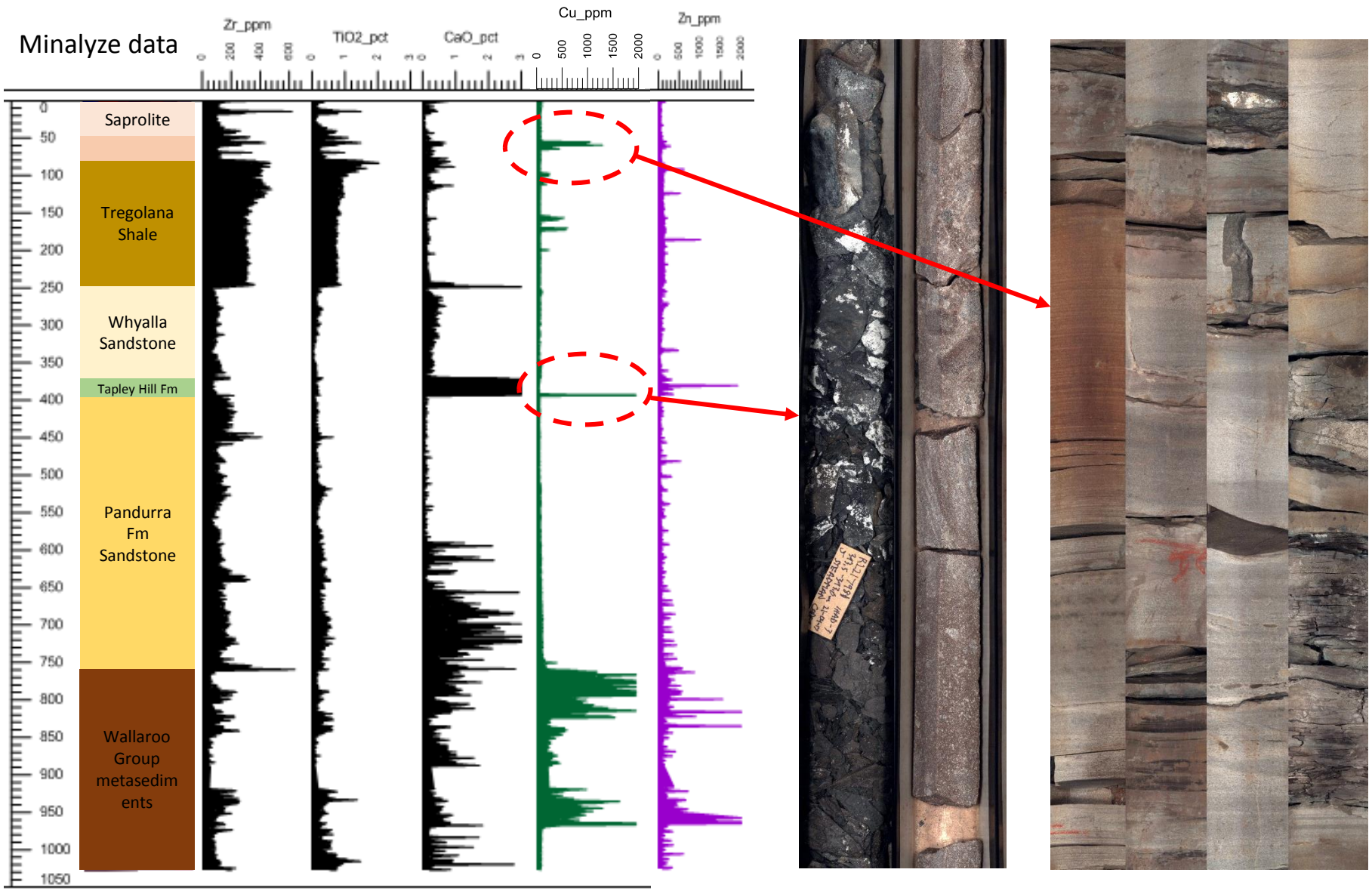
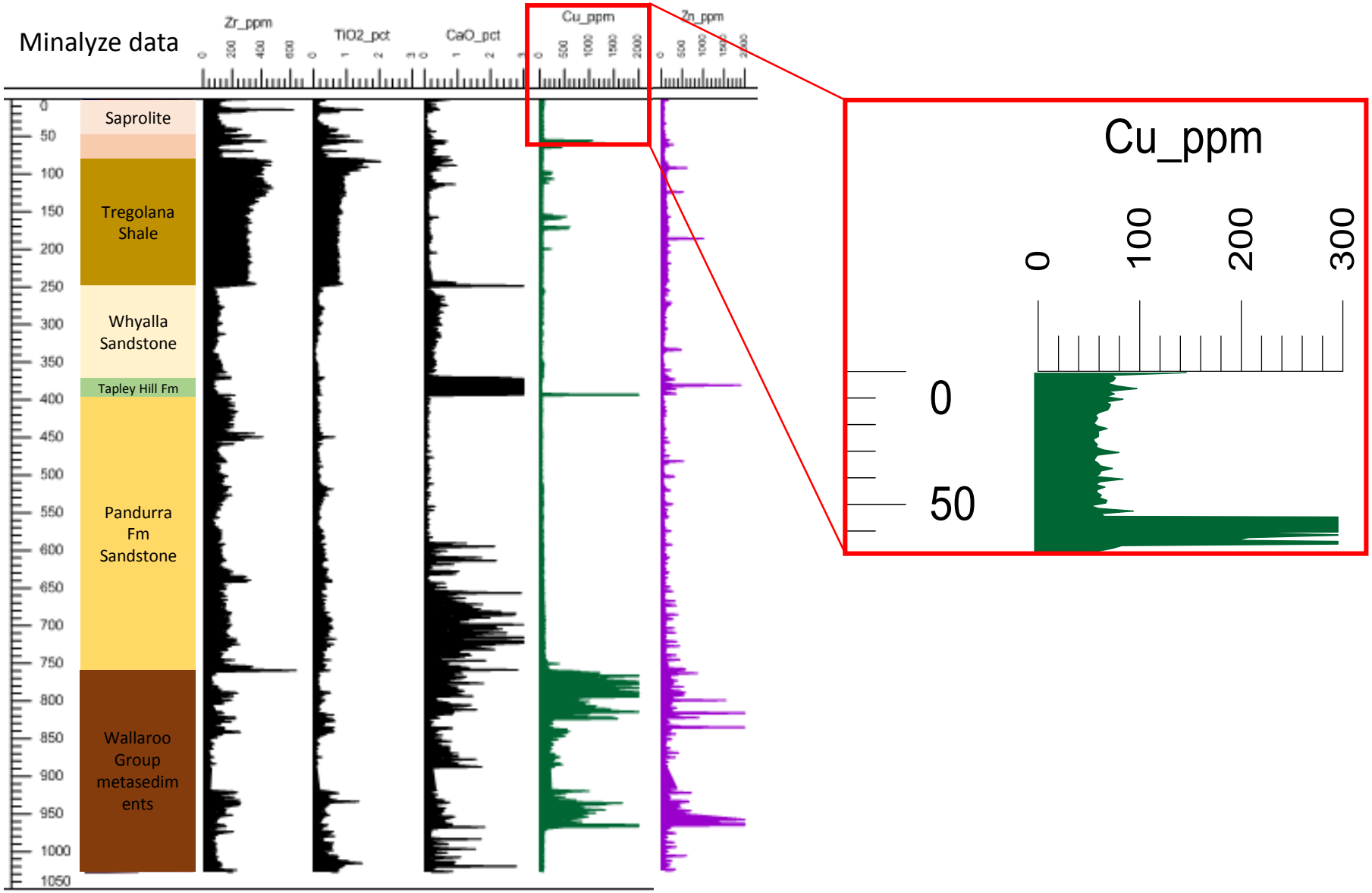
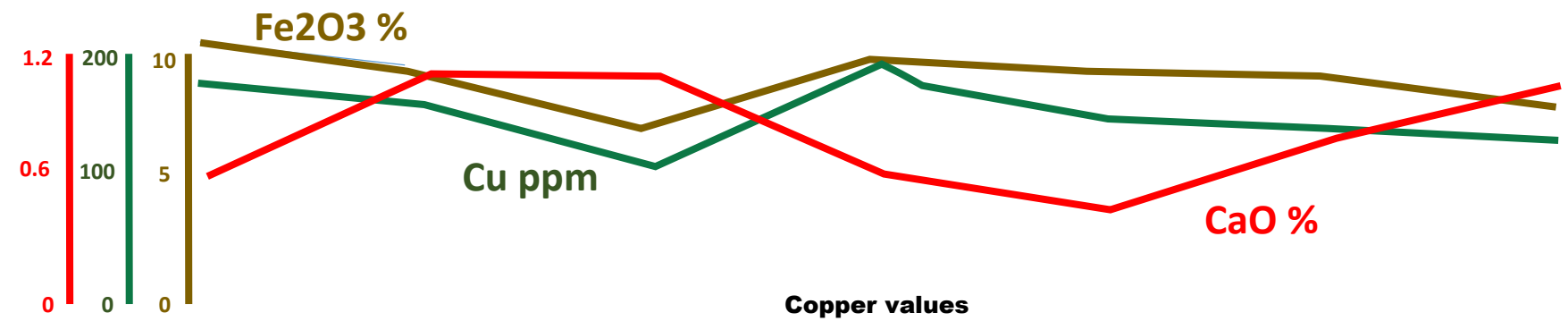
IHAD3 – Emmie Bluff IOCG prospect



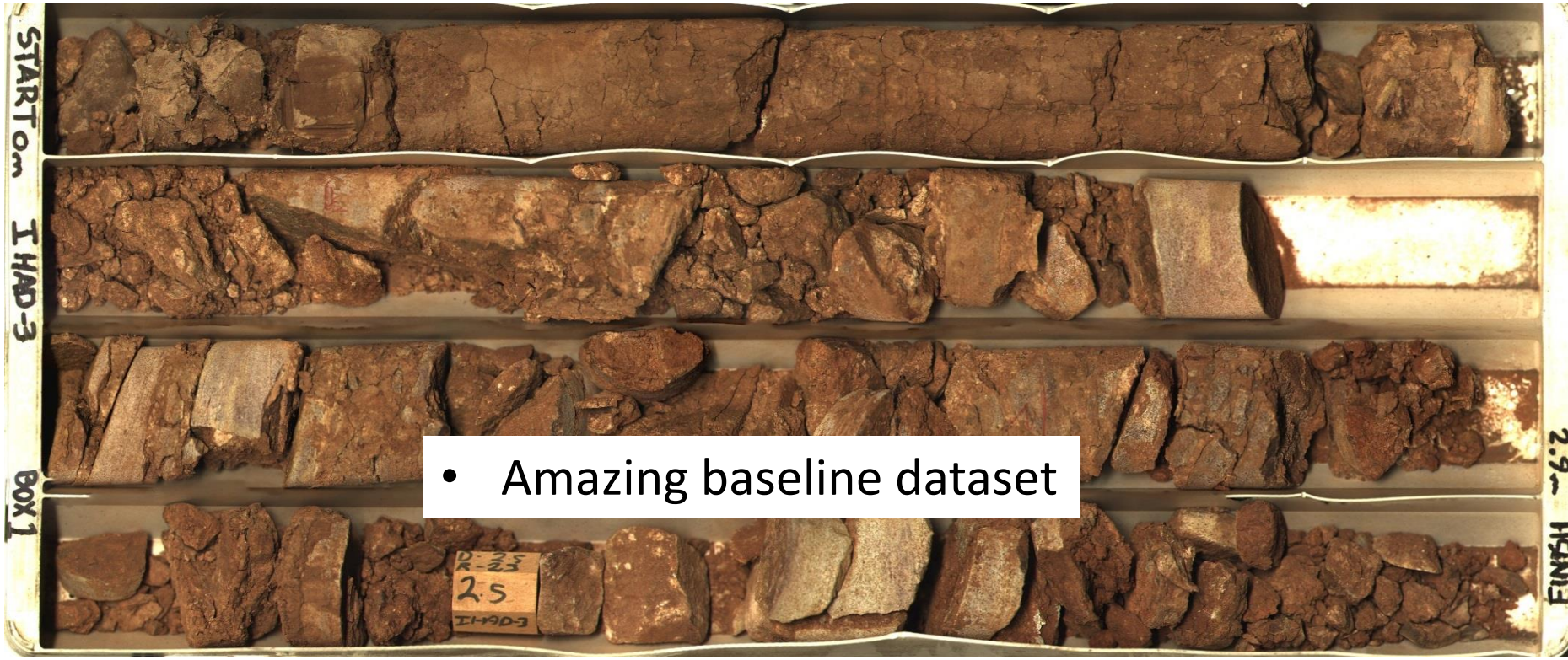
IHAD3 – Emmie Bluff IOCG prospect





Copper values

181 ppm | 163 ppm | 116 ppm | 201 ppm | 150 ppm | 141 ppm | 134 ppm



- Amazing baseline dataset

Summary

Opportunities provided by semi-automated analysis

- Growing desire to collect geochemistry through cover (UNCOVER initiative)
- Emerging technologies enable these data to be collected
- As these data accumulate, provide opportunity for
  - Improved logging and geochemical characterisation of basin sediments and regolith
  - Detection of previously unrecognized mineralisation.
  - Baseline datasets through basins that are currently lacking

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